

REMARKS

Claim Rejections – 35 USC §112

Claims 1 to 11 have been rejected for being indefinite. The claims have been cosmetically amended to conform to US claiming style. No new matter has been added. Withdrawal of this rejection is respectfully requested.

Claim Rejections – 35 USC §102

Claims 1 to 4 have been rejected as being anticipated by Patent Abstract of Japan JP 07 060074 ("JP '074"). Applicants submit that the claims are not anticipated at least for the following reasons.

Claim 1 recites:

1. (Amended) A filter device comprising:
a plurality of hollow fiber membranes having a bundled end and a free end, and
said free end arranged to spread in fluid; and
**injection means for injecting fluid or gas to a center portion of said
plurality of hollow fiber membranes and outwardly radiating the fluid or gas from
the center portion of said plurality of hollow fiber membranes to agitate the hollow
fiber membranes.** (Emphasis added.)

It is clear that JP '074 neither discloses nor teaches any structure that injects fluid or gas to the center portion of the hollow fiber membranes 7 and radiates the fluid or gas outwardly from the center. In JP '074, for backwashing, the permeated liquid from the space 5 is pushed into the housing 6 by introducing air into the space 5 from the air introducing port 4. The permeated liquid is not directed to the center of the hollow fiber membranes 7 to radiate outwardly but apparently forced straight down by air pressure to discharged through the outlet 2. Thus, the present invention of claim 1 is not anticipated by JP '074 at least for the foregoing reason.

Claims 2, 3, and 4, which recite the injection means directly or indirectly, are similarly not anticipated by the cited prior art.

Claims 5 and 6 have been rejected as being anticipated by Heine. Applicants submit that Heine does not disclose, teach, or suggest an injection means of the present invention as claimed in claims 5 and 6. Claim 5 recites:

5. (Amended) A filter device comprising:
a filter cylinder;
a funnel member narrowing in a downward direction and arranged within said filter cylinder;
a filter chamber in said cylinder and disposed above said funnel member;
a recovery chamber in said cylinder and disposed below said funnel member;
a plurality of hollow fiber membranes having a bundled end and a free end, said free end arranged to spread flexibly within said filter cylinder, and said plurality of hollow fiber membranes disposed above said filter chamber; and
injection means for injecting fluid or gas to a central portion of said plurality of hollow fiber membranes and outwardly radiating the fluid or gas from the central portion thereby injecting the fluid or gas to an interior of said filter cylinder. (Emphasis added.)

As indicated by the arrows in Fig. 5 of Heine, the fluid flows from the periphery of the hollow fiber membranes to the inside of the bundled membranes. No injection means that injects fluid or gas to the central portion of the plurality and radiates the fluid or gas outwardly from the central portion is disclosed, taught, or suggested.

On column 9, 36 to 39, Heine states that,

It is also possible to reverse the flow of the permeant, that is, to provide for permeant backflushing of the membrane elements 13 whereby cover layers or other deposits can be removed from the membrane surfaces.

As can be seen from Fig. 5, this backflushing results in linear forced flow of fluid from the permeant collection space 220 along the length of the membrane elements for the whole width of the permeant discharge opening 131. Thus, this passage does not disclose, teach, or suggest an injection means that injects fluid or gas to the center portion of the plurality of hollow fiber members and radiates the fluid or gas from the center portion.

On column 9, lines 19 to 26, Heine states that

In order to prevent blockages of the membrane elements 13 during such an operation of the apparatus or to avoid the [sic] formation of a clogging layer on the surfaces of the membrane elements 13 and also to increase the turbulence of the liquid medium 11 to be separated during its flow through the apparatus air is supplied to the interior 24 of the apparatus 10 at

certain time intervals. The air may be supplied separately or together with the liquid medium 11.

The passage implies that the air is introduced through the passages 221. Therefore, this teaching also does not disclose, teach, or suggest an injection means of the present invention.

Claim Rejections – 35 USC §103

Claims 7, 8/5, 8/7, 9/5, 9/7, 10/9/5, 10/9/7, 11/5, and 11/7 have been rejected as being unpatentable over Heine. Applicants submit that the cited claims are unobvious at least for the following reason.

As previously stated above, Heine does not disclose, teach, or suggest an injection means of the present invention. Therefore, all of the cited claims would not have been obvious to a person of ordinary skill in the art at least for directly or indirectly reciting the injection means.

Furthermore, claim 9 recites:

9. (Amended) A filter device according to any one of claims 2, 5, and 7, wherein said injection means is structured with an injection pipe penetrating a bottom surface of said filter cylinder and inserted through a lower end opening of said funnel member to reach the central portion of said plurality of hollow fiber membranes.

Heine does not disclose, teach, or suggest an injection pipe that is inserted to reach the central portion of the plurality of hollow fiber members. Thus, claim 9 and its dependent claims are not obvious at least for this reason.

Claims 8/2, 9/2, 10/9/2, 11/1, 11/2, and 11/4 have been rejected as being unpatentable over JP '074 in view of Heine. Applicants submit that none of cited claims would have been obvious to a person of ordinary skill in the art for the following reasons.

Because all of the cited claims above directly or indirectly recite the injection means, which neither JP'074 nor Heine disclose, teach, or suggest as explained previously, a person of ordinary skill in the art would not have found the cited claims obvious.

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Furthermore, neither JP '074 nor Heine disclose, teach, or suggest an injection pipe of claim 9. Thus, the present invention of claim 9 would have been obvious to a person of ordinary skill in the art for this reason.

Newly added claim 12 recites the features of claim 9 but also adds the features of holes on the injection pipe. Thus, for the same reason as claim 9, claim 12 is believed to be patentable over the cited prior art.

All of the pending claims, claims 1 to 11 and new claim 12 are believed to be novel and unobvious over the cited prior art.

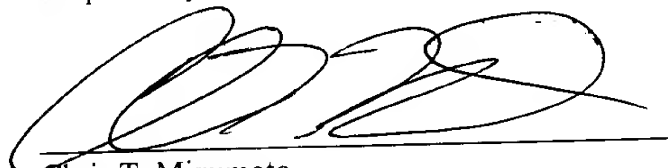
Attached is a marked-up version of the changes being made by the current amendment.

Applicant asks that all claims be allowed. Enclosed is a check for the Petition for Extension of Time fee (two-months). Please apply any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: _____

1/3/03



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Version with markings to show changes made

In the claims:

Claims 1 to 11 have been amended as follows:

1. (Amended) A filter device comprising:

[a hollow fiber membrane module structured with a multiplicity] a plurality of hollow fiber membranes having a bundled [at one] end[s] and a [made] free [at other] end[s], and said free end arranged [for] to spread [into a broom form within] in fluid; and

injection means for [ejecting the] injecting fluid or gas [from] to a center portion [radial central position toward a radial outward] of said plurality of hollow fiber membranes [module] and outwardly radiating the fluid or gas from the center portion of said plurality of hollow fiber membranes to [apply an agitation thereto] agitate the hollow fiber membranes.

2. (Amended) A filter device comprising:

a filter cylinder [to be arranged in a certain direction];

[a hollow fiber membrane module structured with a multiplicity] a plurality of hollow fiber membranes having a bundled [at one] end[s] and [made] a free [at other] end[s], and said free end arranged [for] to spread [into a broom form] within said filter cylinder; and

[raw fluidinjection] injection means for [ejecting raw fluida] injecting fluid or gas [from a radial] to a central portion [position toward a radial outward] of said plurality of hollow fiber membranes [module] and outwardly radiating the fluid or gas from the central portion, thereby injecting [raw fluidsaid] the fluid or gas to an interior of said filter cylinder.

3. (Amended) A filter device according to claim 2, wherein said filter cylinder is [arranged vertical in an axial direction] vertically disposed.

4. (Amended) A filter device comprising:

[a hollow fiber membrane module structured with a multiplicity] a plurality of hollow fiber membranes having a bundled [at one] end[s] and [made] a free [at other] end[s], and said free end arranged [for] to spread [into a broom form within] in fluid;

injection means for [ejecting the] injecting fluid or gas [from a radial] to a central portion [position toward a radial outward] of said plurality of hollow fiber membranes [module] and outwardly radiating the fluid or gas from the central portion to [apply an agitation thereto] agitate the hollow fiber membranes; and

a funnel member[,] disposed below said plurality of hollow fiber membranes [module], made in a form narrowed in opening area] and narrowing in a downward direction.

5. (Amended) A filter device comprising:

a filter cylinder [to be arranged in a certain direction];

a funnel member [made in a form narrowed in opening area] narrowing in a downward direction and arranged within said filter cylinder; [, to define an interior of said filter cylinder with]

a filter chamber in said cylinder and disposed above said funnel member; [on an upper side and]

a recovery chamber [on a lower side] in said cylinder and disposed below said funnel member;

[a hollow fiber membrane module structured with a multiplicity] a plurality of hollow fiber membranes having a bundled [at one] end[s] and [made] a free [at the other] end[s], [and] said free end arranged [for] to spread [into a broom form] flexibly within said filter cylinder, and said plurality of hollow fiber membranes disposed above said filter chamber; and

[raw fluidinjection] injection means for [ejecting raw fluidfluid] injecting fluid or gas [from a radial] to a central portion [position toward a radial outward] of said plurality of hollow fiber membranes [module] and outwardly radiating the fluid or gas from the central portion thereby injecting the [raw fluidsaid] fluid or gas to an interior of said filter cylinder.

6. (Amended) A filter device according to claim 5, wherein said filter cylinder is [arranged vertical in an axial direction] vertically disposed.

7. (Amended) A filter device comprising:

a filter cylinder [to be arranged vertical in an axial direction] vertically disposed;

a funnel member [made in a form narrowed in opening area] narrowing in a downward direction and arranged within said filter cylinder; [, to define an interior of said filter cylinder with]

a filter chamber in said cylinder and disposed above said funnel member; [on an upper side and]

a recovery chamber [on a lower side] in said cylinder and disposed below said funnel member;

[a hollow fiber membrane module structured with a multiplicity] a plurality of hollow fiber membranes having a bundled [at one] end[s] and [made] a free [at the other] end[s], [and] said free end arranged [for] to spread [into a broom form] flexibly within said filter cylinder, and said plurality of hollow fiber membranes disposed above said filter chamber; and

[raw fluidinjection] injection means for [ejecting raw fluidfluid] injecting fluid or gas [from a radial] to a central portion [position toward a radial outward] of said plurality of hollow fiber membranes [module] and outwardly radiating the fluid or gas from the central portion thereby injecting the [raw fluidfluid] fluid or gas to an interior of said filter cylinder; and

a backwash chamber [formed on a top surface of] disposed above said filter cylinder[,] to temporarily store filtrate fluid permeated through said plurality of hollow fiber membranes [module] and [have a] to impart fluid pressure [to be applied] during backwashing.

8. (Amended) A filter device according to any one of claims 2, 5, and 7, wherein said filter cylinder has an inner diameter of 1.5 to 3.0 times the diameter of the bundled end [diameter] of said plurality of hollow fiber membranes [module].

9. (Amended) A filter device according to any one of claims 2, 5, and 7, wherein said [raw fluidinjection] injection means is structured with an injection pipe penetrating a bottom surface of said filter cylinder and inserted through a lower end opening of said funnel member to [structure an upper part inserted in a] reach the central [position] portion of said plurality of

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hollow fiber membranes [module and ejection ports formed in said injection pipe at a part inserted in said hollow fiber membrane module].

10. (Amended) A filter device according to claim 9, wherein [said ejection ports are arranged] the inserted end of the injection pipe is disposed between [a] one-third [position from the upper end and a] and two-thirds [position from the upper end with respect to a longitudinal direction of said hollow fiber membrane] down the length of the plurality of hollow fiber membranes [module].

11. (Amended) A filter device according to any one of claims 1, 2, 4, 5, and 7, wherein said [raw fluidinjection] injection means injects raw [fluidfluid] fluid and bubbling air.